The classification of Dicotyledons

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Among botanical systems of the past century those of Bentham and Hooker and of Engler and Prantl stand out as having received world wide recognition. It is well known that Bessey adopted several points from the Bentham and Hooker system in preference to the Engler system. In 1925 Rendle (4) presented the Engler system with slight modifications, but in part adopted Bentham and Hooker arrangements. The following year Hutchinson (3) in many respects followed the Bentham and Hooker system. The works by Rendle and by Hutchinson may perhaps be considered as modernized forms of the two standard systems; they were briefly compared in Torreya xxvi: 70–75 (1926), where Hutchinson's diagram of dicotyledons is reproduced.

In 1897 Engler published (1) an early diagrammatic representation of dicotyledons. In this Parietales and Rhoeadales (Papaverales) are connected, a connection of special significance. More recent diagrams are those of Hallier, Wettstein, Bessey, Clements, and Hutchinson. It may be that in certain features one system is better, in other features another system is superior.

An arrangement more or less intermediate between the Rendle system and the Hutchinson system is here attempted. Arguments against keeping the herbaceous plants as a separate group are strong. In the following outline and diagram the dicotyledons are grouped around eight genera: *Magnolia*, *Ulmus*, *Cistus*, *Dianthus*, *Geranium*, *Myrtus*, *Ligustrum* and *Rubia*. The arrangement, using the words of Rendle, "does not claim to be strictly phylogenetic."

Magnolia Group (Magnoliflorae)—Perianth parts separate, stamens often many, carpels usually separate or single.

Magnoliales	Rosales
Ranales	Leitneriales

The subsequent groups have generally united carpels.

Ulmus Group (Ulmiflorae)—Usually without petals, often only one seed per ovary, often catkin-bearers.

Urticales	Fagales

Wind-pollination is ill adapted to the diversity of tropical vegetation. Birches, oaks and hickories grow chiefly in northern and temperate climates where plants of the same species are not far apart and thus present comparatively large surfaces to wind-borne pollen. A single ovule per flower is often associated with wind-pollination, but the fused carpels suggest that the ancestral plants had several ovules. Anatomical characters of this group have recently been summarized by Tippo (3).

Cistus Group (Cistiflorae)—Sepals usually separate, placentation usually parietal (that is, separate placentae), stamens and ovules usually many. Parietal placentation precedes axile placentation (2).

Cactales (incl. Aizoaceae)	Papaverales	Salicales
	Sarraceniales	Passiflorales (incl. Cucurbitaceae)
Cistales		
	Aristolochiales	

This group and the following are connected through *Frankenia-Dianthus*, an affinity recognized by DeCandolle and by Bentham and Hooker. They are also connected through Cactaceae-Aizoaceae-Portulacaceae, a relationship recognized by Schumann and also by Engler, though not expressed in the Engler system.

Dianthus Group (Dianthiflorae)—Placentation central or basal, embryo often curved.

Caryophyllales	Polygonales	Primulales
Chenopodiales	Piperales ?	

The following four groups have in nearly all cases axile placentation, that is, placentae united in the center of the ovary. In or near the Geranium Group must come the Ericales.

Geranium Group (Geraniflorae)—Sepals usually united, stamens usually many or in two whorls.

Theales	Rutales	Sapindales
Ericales	Geraniales	Celastrales
Malvales		

For the remaining groups the Engler sequence is approximately followed.

Myrtus Group (Myrtiflorae)—Ovary usually inferior, calyx lobes often very small.

Myrtales	Araliales (Umbellales)

Ligustrum Group (Ligustriflorae)—Sympetalous, ovary superior.

Ebenales	Solanales
Loganiales (Contortae)	Borraginales

Rubia Group (Rubiflorae)—Sympetalous, inflorescence usually dense, ovary inferior.

Rubiales	Asterales

Casuarina, *Balanops*, *Myrica*, Proteales, Santalales, *Euphorbiaceae* and others have not been included in the above outline. As living plants have not descended from each other, any diagram of them can be only a top view, so to speak, of the tree of evolution. It may aid in understanding affinities, but for practical purposes a linear sequence of plant families is required.

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References

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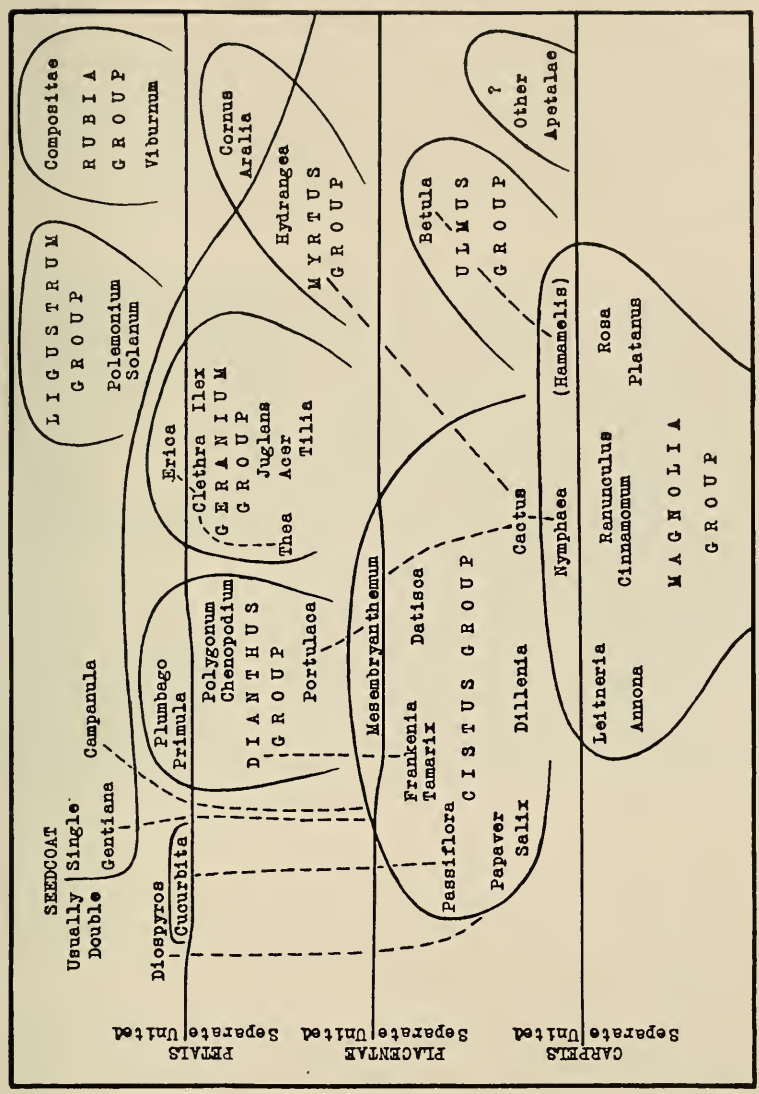
2. Gundersen, A. 1939. Flower Buds and Phylogeny of Dicotyledons. Bull. Torr. Bot. Cl. 69 (May).

3. Hutchinson, J. 1926. The Families of Flowering Plants: Dicotyledons.

4. Rendle, A. B. 1925. The Classification of Flowering Plants: Dicotyledons.

5. Tippo, O. 1938. Comparative Anatomy of the Moraceae and Their Presumed Allies. Bot. Gaz. 100: 1–99.



GROUPS OF DICOTYLEDONS (Gundersen 1939)